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CA 2323846 A1 2002/04/19

(21) **2 323 846**

(12) **DEMANDE DE BREVET CANADIEN
CANADIAN PATENT APPLICATION**

(13) **A1**

(22) Date de dépôt/Filing Date: 2000/10/19

(41) Mise à la disp. pub./Open to Public Insp.: 2002/04/19

(51) Cl.Int.⁷/Int.Cl.⁷ G06K 11/06, G06F 3/02, H01H 13/70

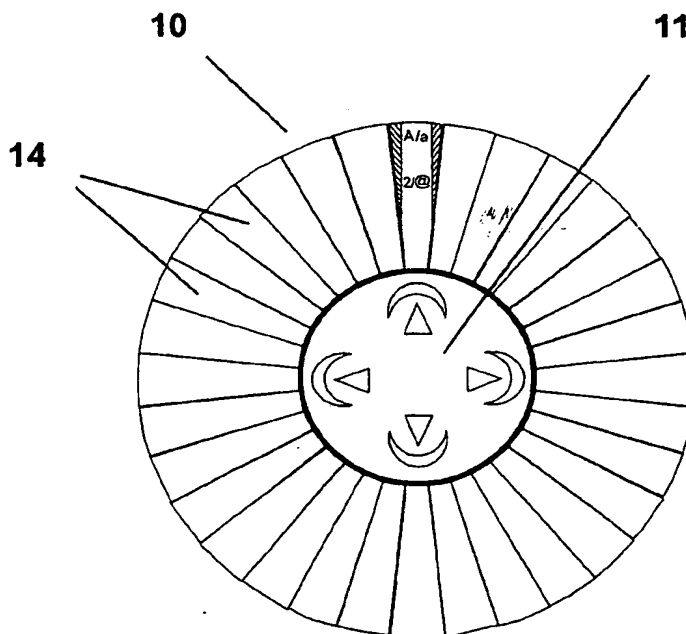
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(54) Titre : INTERFACE D'ENTREE DE CLAVIERS NUMERIQUES POUR DISPOSITIFS ELECTRONIQUES
PERSONNELS

(54) Title: KEYPAD INPUT INTERFACE FOR PERSONAL ELECTRONIC DEVICES



(57) Abrégé/Abstract:

An ergonomically efficient keypad arrangement involves elongated keys in a circular radial configuration. The keys are preferably elongated and wedge-shaped so as to accommodate the radial configuration and to allow a larger surface contact for keying. A useful shape of key is disclosed to allow clear separation between adjacent keys. A shift key arrangement allows the application of a larger number of characters on the keys, arranged in inner and outer pairs. The on-screen displays provides an initial oversized display of a selected character which is confirmed by more fully depressing the key.

ABSTRACT OF THE INVENTION

An ergonomically efficient keypad arrangement involves elongated keys in a circular radial configuration. The keys are preferably elongated and wedge-shaped so as to accommodate the radial configuration and to allow a larger surface contact for keying. A useful shape of key is disclosed to allow clear separation between adjacent keys. A shift key arrangement allows the application of a larger number of characters on the keys, arranged in inner and outer pairs. The on-screen displays provides an initial oversized display of a selected character which is confirmed by more fully depressing the key.

TITLE OF THE INVENTION

KEYPAD INPUT INTERFACE FOR PERSONAL ELECTRONIC DEVICES

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TECHNICAL FIELD OF THE INVENTION

This invention relates to a keypad for a personal digital assistant ("PDA"). More particularly, this invention relates to an ergonomically optimized keypad for data entry using single or dual thumb input operation and a method for inputting and displaying data on the screen of a personal digital assistant using such keypad.

15

BACKGROUND OF THE INVENTION

The problem of designing a user input interface for PDAs is that screen size and available keypad area are limited. PDAs are usually equipped with a few control buttons on the front surface and a stylus. The complexity and inefficiency of the touch screen input has determined the need for a small, intuitive to use keypad allowing the same number of characters, punctuation, and functions as the normal size PC keyboard, and being small enough to avoid the crowding of the display screen.

25

The PDA disclosed in US Patent No. 5,515,305 uses a chord keyboard allowing entry of a number of characters substantially greater than the number of keys in the chord keyboard. In order to display a character on the screen the user must depress several keys simultaneously according to a pre-established combination for that

particular character. As a result the entry of 256 unique characters can be accommodated with only 8 keys.

US Patent No. 5,487,616 discloses an ergonomic one-finger
5 keyboard used for small hand held computers with the keys corresponding to the most commonly used characters positioned in a central area. The rest of the keys are further arranged such that keys most frequently used in conjunction with each other are located in adjacent locations.

10 A miniaturized keyboard that allows an easy operation of the keys is described in US Patent No. 6,103,979. In this case each key has an elongated shape and is supported by a fulcrum which allows it to tilt when the operator presses either end of the key establishing two different switches provided for each key of the keyboard. As a result the overall
15 dimension of the keyboard is reduced and the number of possible input characters is the same as on a traditional keyboard.

Such prior art keyboard arrangements have certain limitations and disadvantages. Chord keyboards like the one described in US Patent No.
20 5,515,305 involve depressing multiple keys simultaneously for obtaining a single keystroke. The other two US Patents Nos. 5,487,616 and 6,103,979 do not offer the best possible solution for reducing the overall dimensions of a keyboard for PDAs.

25 The present invention proposes to solve these problems by providing for an easy to use electro-mechanical key interface offering 128 symbols and a graphical interface which will make input items easier to identify.

SUMMARY OF THE INVENTION

The present invention proposes a keypad of a circular shape
5 because the circle contains the greatest possible working area in the
smallest possible linear dimensions. The input keys are wedge-shaped
radiating out from the center. The input characters are arranged on the
keys in two concentric rings. One shift key is used for providing two inputs
10 from each key by selecting one of the two characters that are positioned
on either the inner or the outer concentric ring on the keys. An inner/outer
selector key is used for selecting one pair of characters positioned on the
inner or outer concentric ring.

Because the human thumb has great agility and because one tends
15 to hold PDAs in the palm and fingers, the present invention proposes
single or dual thumb operation input although preferences will vary.

In addition, because confirmation of digital input may be different
from the ultimate digital input into a line entry in an application, the present
20 invention proposes a preliminary display of the desired input symbol in a
format far larger than its actual input form. In this way the user will be able
to preview the character that was entered before the entry is actual send to
the computer.

25 Other aspects of the invention are defined in the claims and will be
appreciated by reference to the detailed description of the preferred
embodiment and to the drawings that follow.

BRIEF DESCRIPTION OF THE DRAWINGS

The preferred embodiment of the invention will be described by reference to the drawings thereof in which:

5

Fig. 1 is a plan view of a keypad according to the preferred embodiment of the invention;

10

Fig. 2 is a cross sectional view of a wedge-shaped key, Fig. 2A showing a side view and Fig. 2B showing an end view of the key;

Fig. 3 is a side view of the wedge-shaped key;

15

Fig. 4 is an illustration of the device screen illustrating the confirmation phase of character input; and,

Fig. 5 is an illustration of the whole device showing all of the operating buttons.

20

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENT

25

The preferred embodiment of the present invention comprises a circular keypad 10 for a personal digital assistant (PDA). Thirty-two wedge-shaped keys 14 radiate out from the center of the keypad. The input characters and symbols are distributed in pairs arranged in two concentric rings on the outer perimeter of the keypad. The keypad also comprises a

tilting circular enter/cursor key positioned in the center that serves to position the cursor and that incorporates an enter/select functionality similar to a mouse click.

5 A shift key 16 and an inner/outer selector key 18 are positioned on the left hand side of the device at a certain distance from the keypad. The combination of these two keys allows the input of four characters per key simultaneously (an inner/outer arrangement of two pairs of shiftable characters on each wedge-shaped key).

10

The keypad is can be any of a multiplicity of diameters according to the dimensions of the device for which it is intended, but a 3 inch diameter keypad will serve for the purposes of describing the preferred embodiment. Each wedge-shaped key is 0.285 inch wide at the outer edge and 1.5 inch
15 long covering an angle of 11.25 degrees on the 3 inch diameter circle of the keypad.

As shown in Figs. 2 and 3, each key 12 has a sloping shoulder 20 and a flat top 22 on which the characters are printed. This shape allows for
20 sufficient separation between keys to enable depression of individual keys to be effected without interference with adjacent keys by the operating digit. The depression of the key also provides for a graduated process by which the character corresponding to the key which is depressed is displayed on the screen in a larger format upon initial touch as shown in
25 Fig. 4 for facilitating the visual confirmation that the appropriate character has been selected. Upon increased pressure the selected character is entered into the appropriate input space on the screen in its normal screen format size. This provides for an easy user confirmation of selected characters.

The present invention provides for a total of 128 characters (32 on the outer ring with a shift option creating 64 characters and 32 characters on the inner ring with a shift option creating another 64 characters). Each wedge-shaped key has two pairs of two possible input characters on it which can be displayed when the wedge-shaped keys are used in combination with the shift key and inner/outer key.

The mechanism for establishing electrical contact upon depression of the keys utilizes prior art circuit technology. Similarly display of initial oversize characters on the screen upon first phase digital key depression followed by regular sized character display upon completion of digital key depression also utilizes prior art which those familiar with the field will appreciate.

The specific arrangement of characters on the keys can follow any of a multiplicity of designs although in the preferred embodiment the letters will be arranged alphabetically on the outer circumference with 'A' in the twelve o'clock position moving clock wise and with numerals 1 to 0 on the inner circumference with 1 at the corresponding twelve o'clock position, the others following clockwise. Punctuation and other symbols and functions fill the remaining spaces as shown in Fig. 1.

It will be appreciated that although the preferred embodiment of the invention has been described in some detail, modifications may be made and variations may be practised without departing from the broader principles of the invention.

CLAIMS

1. A keypad for providing character input to an electronic device, said keypad comprising a plurality of keys arranged radially from a common
5 point on said keypad.
2. A keypad as in claim 1 wherein said keys are elongated in the radial direction.
- 10 3. A keypad as in claim 1 or 2 wherein said plurality of keys define a complete circle about said common point.
4. A keypad as in claim 1 or 2 wherein said keys are wedge-shaped.
- 15 5. A keypad as in claim 2 wherein said keys are wedge-shaped and said plurality of keys define a complete circle about said common point.
6. A keypad as in claim 1, 2 or 5 wherein said keys have sloping side shoulders and a flat top for providing a clear separation of keys during key
20 entry.
7. A keypad of claim 1 wherein at least two input characters are displayed on each of said keys.
- 25 8. A keypad as in claim 7 wherein said keypad further comprises a shift key for selecting between said at least two input characters.

9. A keypad as in claim 8 wherein said at least two input characters comprise two pairs of characters, and wherein said keypad further comprises a key for selecting between said two pairs.

5 10. A keypad as in claim 9 wherein said pairs on adjacent radially disposed keys form two concentric rings on said plurality of keys.

11. A keypad as in claim 10 wherein said key for selecting between two pairs selects one of said concentric rings.

10

12. A method for providing input data to an electronic device having a display screen and a keypad, comprising the steps of:

selecting an input character through a first user action;

15

displaying said input character on said screen in a font that is larger than the regular size font of other characters displayed on the screen;

20

confirming the selection of said input character through a second user action; and,

displaying said input character on said screen in regular size font.

25

13. A method for inputting and displaying text characters in an electronic device that includes a keypad and a screen comprising:

receiving the selection of an input character identified through a first user action;

displaying said input character on said screen in a font that is larger than the regular size font of the other characters displayed on the screen;

5

receiving confirmation of the selection of said input character through a second user action; and,

displaying said input character on said screen in regular size font.

10

14. A method as in claim 13 wherein said device further comprises keys selectively depressible to a first position or to a second position, and wherein said first user action comprises depressing one of said keys to said first position and said second user action comprises applying an increased pressure on said key.

15

15. A method as in claim 14 wherein said device further comprises keys selectively depressible to a first position or to a second position, and wherein said first user action comprises depressing one of said keys to said first position and said second user action comprises applying an increased pressure on said key.

20

16. A method according to claim 12, 13, 14 or 15 wherein said device further comprises a keypad with a plurality of keys arranged radially from a common point on said keypad for selectively sending an input character to the display screen.

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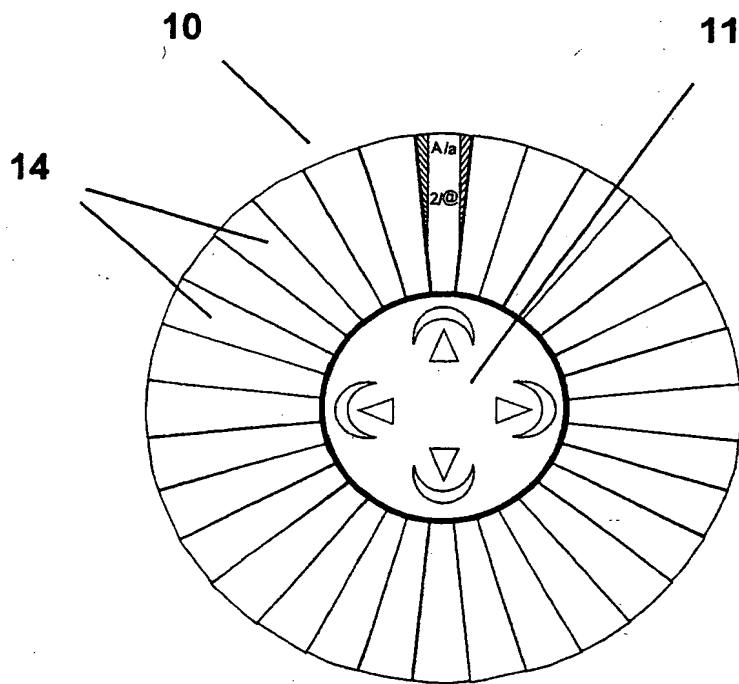


Figure 1

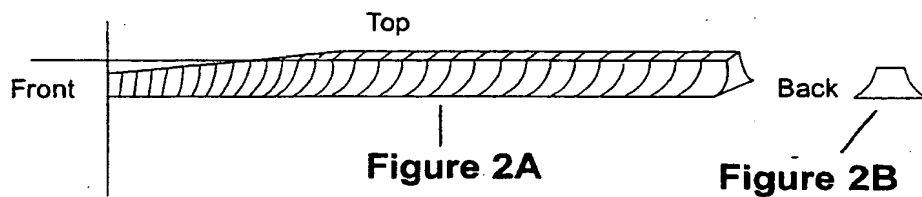


Figure 2A

Figure 2B

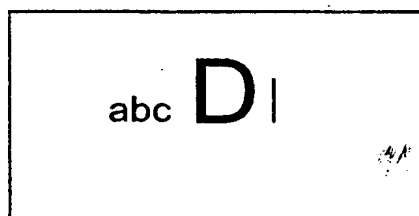
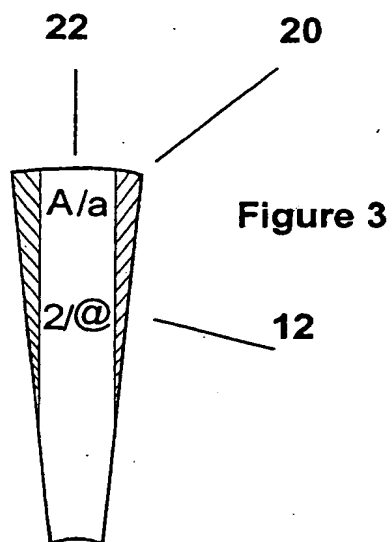


Figure 4

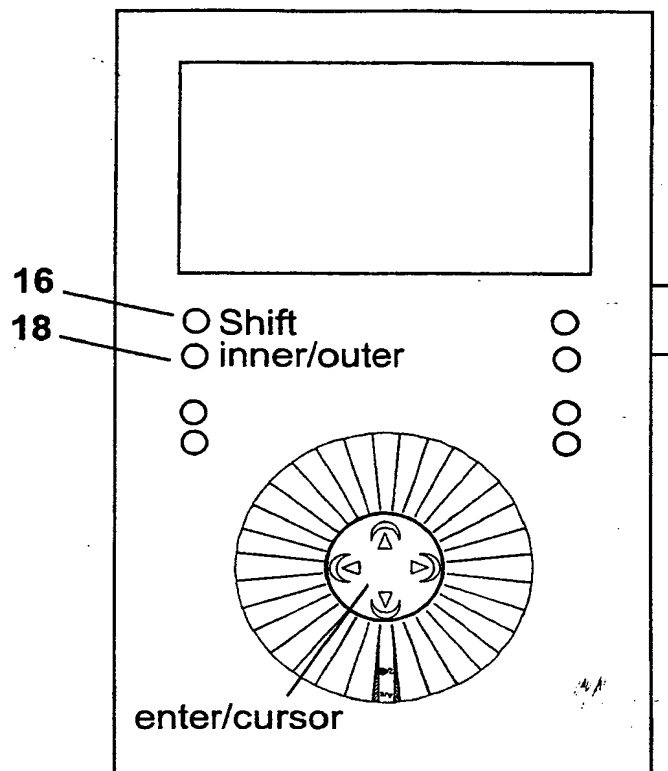


Figure 5